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Mood effects on eyewitness memory: Affective influences on susceptibility to misinformation ☆

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Abstract

Does mood influence the accuracy of eyewitness recollections, and people's susceptibility to misleading information in particular? Based on recent affect-cognition theories and research on eyewitness memory, three experiments predicted and found that positive affect promoted, and negative affect inhibited the incorporation of misleading information into eyewitness memories. This effect was obtained for both positive and negative events (Experiment 1), and for recorded as well as real-life incidents (Experiment 2). Participants had no meta-cognitive awareness of these mood effects, and affect-control instructions were ineffective in preventing them (Experiment 3). The cognitive mechanisms responsible for mood effects on eyewitness memories are discussed, and the implications of these findings for everyday memories, forensic practice and for current affect/cognition theorizing are considered.

Keywords: Affect and cognition; Eyewitness memory; Social cognition

Accurately remembering personally witnessed events is one of the more important cognitive tasks we face in everyday social life. Most people implicitly assume that their eyewitness recollections are generally accurate and reliable, and eyewitness memories are often accorded special evidentiary status by judicial and forensic organizations. This assumption of eyewitness accuracy, however, may not always be justified. Research documents numerous instances of inaccuracies in eyewitness testimony and constructive memory errors (e.g., Loftus, 1979; Malpass, 1996; Penrod & Cutler, 1996; Schooler & Loftus, 1993; Wells & Loftus, 2003).

Surprisingly, relatively little attention has been paid to the influence of mild mood states, as distinct from more intense emotions or arousal states on the accuracy of eyewitness memories (Brown, 2003; Wells & Olsen, 2003). Moods may influence memory at each of the three stages of the eyewitness process: when the event is first witnessed (encoding stage), later when potentially misleading information is encountered (post-event stage), and finally, when the information is retrieved and judgments are made (retrieval stage). This paper will focus on the post-event stage, exploring the influence of moods on the incorporation of false information into subsequent recollections. Drawing on past research on eyewitness memory and recent work on mood effects on information processing, these three experiments explore the possibility that good moods can accentuate, and bad moods can inhibit the incorporation of subsequent misleading information into eyewitness reports, consistent with the information processing consequences of these affective states. In particular, the more externally oriented and

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systematic information processing style elicited by negative moods may reduce the likelihood of misleading information being incorporated into the eyewitness recollections, and thus improve the accuracy of memories. In contrast, the more constructive and assimilative processing style associated with positive moods may impair eyewitness accuracy by increasing the likelihood that subsequent misleading information will be uncritically incorporated into eyewitness memories (Fiedler, Asbeck, & Nickel, 1991).

Misleading information and eyewitness accuracy

Social perception and judgments require highly constructive strategies to select, recall and interpret information about people and events (Fiedler et al., 1991; Loftus, 1979; Wells & Loftus, 2003). In a series of highly influential experiments, Elizabeth Loftus showed that people are easily misled and report erroneous memories as a result of being exposed to incorrect post-event information (Loftus, 1979). One common way that eyewitnesses can be exposed to post-event misinformation is by being asked (mis)leading questions, that is, questions that contain information about the observed episode that was not in fact part of the original event. For example, a misleading question suggesting that there was a 'give way' sign rather than a 'stop' sign in a traffic accident scene can produce a significant increase in incorrect memories suggesting that the 'give way' sign was part of the original scene (Loftus, 1979).

In a similar way, a question like "How fast was the white sports car going when it passed the barn while traveling along the country road?" produces an increased tendency by eyewitnesses to report having seen a barn, even though this was not part of the original scene (Loftus, 1979). Even such subtle post-event clues as a change from the indefinite to the definitive article (*a* to *the*) can produce memory biases. Participants who were asked "Did you see *the* broken headlight?" were more likely to report seeing it later on than did those asked "Did you see *a* broken headlight?" (Loftus, 1979).

This memory-biasing effect of post-event information is known as *the misinformation effect* (Schooler & Loftus, 1993). Some explanations of the effect suggest that the original memory trace becomes overwritten by the misinformation received later on (Loftus, 1979). Other theories propose however that subsequent misinformation does not eliminate the original memory, but simply interferes with its accessibility and retrieval (Bekerian & Bowers, 1983). It was also suggested that the effect may depend on the strength of the memory trace; strong memories are more likely to resist misleading suggestions than weak memories (Pezdek & Roe, 1995; Reyna & Lloyd, 1997).

Various social factors may also influence susceptibility to the misinformation effect, such as the age and status of the person making the misleading suggestion (Ceci & Bruck, 1993). When considering these cognitive and social influences jointly, it seems that the way the person processes questions containing misleading information should have a critical influence on the extent to which the false information will be rejected, or incorporated into eyewitness memories. More constructive and assimilative thinking may increase the tendency to uncritically incorporate false details into memory (Fiedler et al., 1991), while externally oriented accommodative processing may reduce the misinformation effect. Interestingly, recent evidence suggests that mild mood states can in fact promote exactly these kinds of differences in processing style, promoting assimilative or accommodative thinking (Bless, 2000; Fiedler, 2001; Fiedler & Bless, 2001), and may well influence people's susceptibility to the misinformation effect.

Affect and eyewitness memories

Although the profound influence of affect on the way people think and behave has long been recognized, mood effects on eyewitness memory have received relatively little attention (cf. Eich & Schooler, 2000; Schooler & Eich, 2000). All things being equal, affective states seem to facilitate the recall and use of affect-congruent rather than incongruent information, and information encountered in a matching rather than a non-matching mood state (Bower & Forgas, 2001; Clore, Gasper, & Garvin, 2001; Eich & Macauley, 2000). Indeed, such mood-induced memory biases can even influence the way people think about highly familiar and involving events, such as incidents in their intimate relationships (Forgas, 1994). By facilitating access to mood-congruent information in memory, affective states can exert a powerful *informational* influence on the kind of evidence people access when encoding and recalling the details of complex events (Berkowitz, Jaffee, Jo, & Troccoli, 2000; Bower & Forgas, 2001; Eich & Macauley, 2000; Fiedler, 2001; Forgas, 1995, 2002). Alternatively, mood states can also serve as heuristic cues influencing evaluative judgments in a mood-congruent direction (Clore et al., 2001; Martin & Clore, 2001; Schwarz & Bless, 1991). Because memory is often better for mood-congruent rather than mood-incongruent information, we may expect that congruence between transient mood and the affective tone of a witnessed event may offer some defence against the misinformation effect and thus contribute to the accuracy of eyewitness memories, a possibility we investigated in Experiment 1.

In addition to such *informational* effects, moods can also exert a significant *processing* effect on how people deal with social information. Research on decision-

making, persuasion, and creativity (Bless, 2000; Bless, Mackie, & Schwarz, 1996; Fiedler, 2001) suggests that different mood states produce reliable differences in information processing style.

Several studies initially suggested that positive moods may lead to less effortful and systematic processing strategies (Bodenhausen, 1993; Clark & Isen, 1982). In contrast, negative moods were thought to facilitate more careful, vigilant and systematic processing (Schwarz, 1990; Schwarz & Bless, 1991). However dysphoria can also reduce attentional resources (Ellis & Ashbrook, 1988). A number of competing explanations for these mood-induced processing differences were proposed. *Functional* explanations suggested that good mood signals that the situation is favorable and little processing effort is required, whereas bad moods recruit more systematic and vigilant processing (Schwarz, 1990; Schwarz & Bless, 1991). Other theorists posited a *motivational* explanation, as happy people may try to preserve their good mood by avoiding cognitive effort (mood maintenance), and dysphoric individuals increase cognitive effort to improve their aversive mood state (mood repair) (Clark & Isen, 1982). Finally, *processing capacity* may also be impaired by positive moods according to some studies (Stroessner & Mackie, 1992). However, negative moods may also reduce processing capacity (Ellis & Ashbrook, 1988), and some researchers report that positive mood may actually enhance rather than inhibit performance on certain tasks (Bless et al., 1996).

Recently, Fielder and Bless (2001; Fielder, 2001; Bless, 2000) developed a more comprehensive explanation of affective influences on information processing style. They noted that mood-induced processing differences are unlikely to be simply due to changes in cognitive effort, as performance on secondary tasks remains unimpaired by positive mood (Bless, 2000). Instead of merely influencing processing effort, these authors suggest that different moods actually induce qualitatively different *styles* of processing. Negative moods call for *accommodative* processing, focused on the actual details of the external world. In contrast, positive moods signal a benign, predictable environment, and induce *assimilative* and constructive processing where the individual relies on existing knowledge and heuristic, schematic thinking to perform a task (Bless, 2000; Fiedler, 2001). Recent integrative affect/cognition theories such as the Affect Infusion Model (AIM; Forgas, 1995, 2002) also predict that positive and negative moods should produce such a difference in how novel stimulus information is processed (Forgas, 1998a, 2002).

Applying these theoretical accounts to eyewitness accuracy, we may expect that people in a negative mood will be more attentive to situational details and so be less influenced by misleading information than are people in a positive mood. Negative affect should thus improve eyewitness accuracy by reducing the likelihood that misleading information will be incorporated into eyewitness recollections. In contrast, a more constructive and assimilative processing style associated with positive affect may exacerbate the constructive errors associated with misinformation effects. Consistent with this prediction, Fiedler et al. (1991) found that people experiencing a positive mood are more likely to engage in constructive processing and are more influenced by prior priming manipulations when forming judgments about people. Indeed, Fiedler et al. (1991) explicitly argue for the need to examine "the mediating role of mood in eyewitness testimony" (p. 376), the main objective of the present experiments. Another relevant series of experiments by Forgas (1998a) found that people experiencing negative affect were less likely to commit the fundamental attribution error, whereas those in a positive mood made more constructive internal attributions, apparently ignoring information about external constraints.

Aims and predictions

Thus, the aim of this paper is to explore the influence of transient mood states on eyewitness accuracy, and the incorporation of misleading details into eyewitness memories in particular. Based on previous theories and research, we expected that those in a positive mood should engage in more constructive, assimilative and less externally focused processing, and should be more likely to incorporate misleading information into their eyewitness memories. Negative mood, in contrast, should facilitate a more externally oriented, piecemeal and bottom–up processing style, reducing the likelihood that misleading information will influence eyewitness recollections. Experiments 2 and 3 also explored the level of meta-cognitive awareness and confidence people had in the accuracy of their eyewitness reports. The influence of affect-control instructions and individual difference variables (Hosch, 1994; Schooler & Loftus, 1993; Tomes & Katz, 1997) on these effects was also assessed.

Experiment 1

The first experiment was designed as an initial test to see if transient moods can indeed influence the mistaken incorporation of false information into eyewitness reports. We predicted that good mood should increase, and bad mood should reduce people's susceptibility to misleading information. Further, based on evidence for mood-congruent influences on memory (Eich & Macauley, 2000; Fiedler, 2001; Forgas, 2002), this experiment also investigated the possibility that exposure to misleading information may have less of an effect when mood and the affective tone of the witnessed event are congruent rather than incongruent.

Method

Overview, design, and participants

The session was introduced as comprising several unrelated experiments, carried out over a 2-h period. Participants first viewed two A4 size pictures for 1 min each, showing an image of a complex car crash scene (negative event), and a wedding party scene (positive event), and were instructed to 'look at these pictures as if you unexpectedly encountered these events while walking on the street'. After various other activities, about 1 h later, and allegedly as part of an unrelated study, they received an autobiographical mood induction (they were asked to re-experience and write about positive, neutral and negative episodes from their own lives). Immediately afterwards, participants completed a short questionnaire about the scenes they saw earlier that either did, or did not contain misleading information about these events. After a further 45-min interval filled with distraction tasks, the accuracy of their eyewitness memory for the scenes was tested. The experiment involves a $3 \times 2 \times 2$ design, with affect (happy, control, and sad), the provision of misleading information (present/absent), and the affective tone of the event witnessed (positive, negative) as the independent variables. Participants were 96 students (54 female, 42 male) with a median age of 19 who completed the experiment as part of their course requirements.

The target events

The target scenes showed either a complex car crash scene (negative event), featuring a large number of people, policemen, ambulance personnel and two damaged cars in a complex urban setting, or a wedding celebration (positive event), with a bride, a groom, and a large number of guests in a party setting. These images were selected from some 24 everyday scenes collected from photo magazines and the internet, which were pre-rated by a pilot sample of 16 students for affective valence, complexity and realism on 7-point scales. The two scenes were selected as they were most consistently rated as high on complexity ($M = 5.87$ and 6.11; $SD = 1.21$ and 1.30) and realism ($M = 6.39$ and 5.61; $SD = 1.06$ and 1.26), and were highly and reliably different in terms of valence ($M = 1.38$ and 6.05; $SD = .89$ and 1.17).

Mood induction

The mood induction task was described as an unrelated study of 'life events'. Participants were asked to "identify a specific social event that has occurred in your life that has made you very happy (sad)… imagine the situation as vividly as you can. Picture the event actually happening to you. Try to experience all the details of the situation...think through the thoughts that occurred to you… feel the same feelings you felt… describe the event you remembered as vividly as you can including all the important details." In the neutral condition they were asked to describe their activities while they were getting ready for university this morning. Participants then took around 10–12 min to reflect on, and to write down their positive or negative experiences. This autobiographical procedure was found highly effective in inducing negative or positive mood states in the past (Forgas, 1995).

The delivery of misleading information

After the mood induction, participants completed a short questionnaire asking four questions each about the car accident scene, and about the wedding party scene. Each question was prepared in two versions: a direct version containing no misleading information (e.g., 'Did you see the overturned car on the roadside?' 'Did you see the police vehicle on the scene?'), and a parallel form containing planted, misleading information (set in *italics* here: 'Did you see the overturned car next to the *broken guard rail*?' 'Did you see the fireman *holding a fire hose?*). Each participant received either the direct form or the misleading form for both scenes in a complete between-subjects design.

Mood validation measure

After exposure to the misleading questions, a brief post-experimental questionnaire was administered, designed to validate the effectiveness of the mood induction. Embedded among several distracter items (e.g., Did you find the task difficult? Have you done similar tasks before?), participants were also asked to rate their current mood on seven-point happy–sad and good–bad scales.

Measure of eyewitness accuracy

After performing a series of unrelated distracter tasks for about 45 min, the measure of eyewitness accuracy was administered. The questionnaire contained 12 true/false questions about each of the two observed scenes. For each scene, four questions evaluated memory for actual, correct details of the scene, four questions tested memory for false, misleading details that were only introduced during the previous questioning following the mood manipulation, and four questions evaluated incorrect details not encountered previously. Based on these responses, three measures were derived by adding the correct responses in each category: number of *correct details* recalled, number of *misleading details* recalled, and number of *incorrect details* recalled.

Debriefing

The study concluded with a thorough debriefing. There was no evidence of any awareness by participants of the hypotheses and the manipulations. We took care to reduce and eliminate any residual mood after-effects.

Results

Mood validation

As participants' self-rated mood on the seven-point happy–sad and good–bad scales was highly correlated, a single combined measure of mood valence was created (Cronbach's $\alpha = .82$). An analysis of mood ratings found a highly significant mood effect $F(2,93) = 5.64$; $p < .01$. Participants who thought about a positive life event were in a significantly better mood, and those thinking of a negative event were in a worse mood than did those who reflected on a neutral event ($M = 2.24$, 3.66, 4.98; $t(62) = 3.41$; $p < .01$; $t(62) = 2.53$; $p < .01$). These results confirm that the affect induction was highly effective, and produced significantly different mood states that endured until well after the delivery of the misleading information (Forgas, 1995, 2002).

Eyewitness accuracy

The three measures of eyewitness memory (recollection of correct, misleading and incorrect details) for the two scenes were first subjected to a $3 \times 2 \times 2$ MANOVA. Results showed a significant main effect for exposure to misleading information $F(1,84) = 3.33$; $p < .05$, and a significant interaction between mood and exposure to misleading information, $F(2,84) = 3.95$; $p < .05$ using the Wilks lambda criterion. No other significant effects were found. Further separate analyses of variance were conducted on recollections of correct, misleading and incorrect details. We found that neither mood, nor the provision of misleading information, nor the valence of the events or their interaction had a significant main or interaction effect on recognition memory for *correct* and *incorrect* details. In fact, this is what we would expect, as these memories were not directly manipulated.

As predicted, the provision of misleading information did have a significant main effect on memory for misleading details, producing more 'false alarms' (recognizing misleading details as part of the original scene), $F(1,84) = 4.86$; $p < .01$. Those exposed to misleading information were significantly more likely subsequently to remember such details as part of the original scenes than were those not exposed to such information, once again demonstrating the misinformation effect (Loftus, 1979). Of greatest interest is that there was also a significant interaction between the presence of misleading information and mood, $F(2,84) = 4.97$; $p < .01$, which showed that positive mood increased, and negative mood decreased the tendency to incorporate misleading details into recollections, as illustrated in Fig. 1. In fact, misleading information did not have a significant influence on 'false alarms' by participants experiencing negative moods. In contrast, individuals who experienced a positive or neutral mood while exposed to the misleading information were significantly more likely to incorporate these details into their recollections, $t(31) = 3.13$; $p < .01$, $t(31) = 2.41$; $p < .05$.

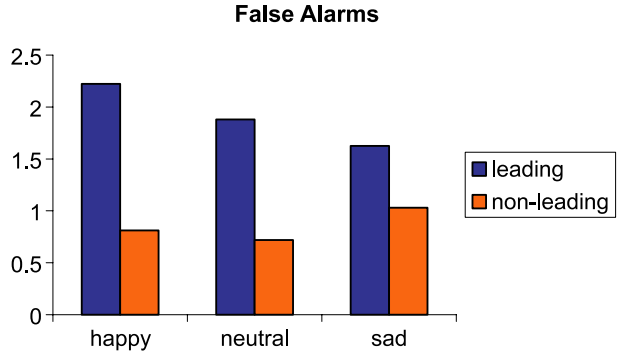

Fig. 1. The interaction between mood and the presence or absence of misleading information on recognition (Experiment 1): positive mood increased, and negative mood decreased the likelihood that misleading information provided after the event will be incorporated in eye-witness memory.

Contrary to our predictions, the affective tone of the observed event had no main or interaction effects on memory. It seems that any memory benefit produced by matching the mood of the participants with the affective tone of the event was not sufficiently large or robust to represent a significant defense against the incorporation of false details into eyewitness memories.

Signal detection analysis

To provide an integrated analysis of the entire recognition performance, a signal detection analysis based on all responses was carried out. First, the hit rate and false alarm rate for each participant was calculated and a standard correction was applied when these rates were 0 or 1 (Snodgrass & Corwin, 1988). Next, measures of discrimination (d′) and bias (C) were calculated using log transformed data to approximate a normal distribution using a method suggested by Brophy (1986). Higher values on the *discrimination* (d′) measure indicate that a participant had greater ability to discriminate between correct and incorrect details. Positive values on the *bias* (C) measure indicate a conservative bias of rejecting doubtful information as incorrect, while negative values indicate a liberal bias of accepting information as correct.

Discrimination (d′) was significantly influenced by mood, $F(2,90) = 3.99$; $p < .05$. Negative mood at the time of exposure improved participants' ability to discriminate between correct and incorrect details compared to the control group and the positive mood groups, $t(63) = 2.12$, $p < .01$; $t(63) = 1.79$; $p < .05$ ($M = .65$, .43, .37), with no difference between the neutral and positive groups. As expected, exposure to false information impaired participants ability to discriminate between correct and incorrect details, $F(2,90) = 3.57$; $p < .05$; ($M = .54$, .35). An analysis of the response bias measure (C) showed no significant mood or exposure effects,

$F(2,90) = 1.33$; *NS*; $F(2,90) = .86$; *NS*. This is as expected, as there should be no link between exposure to misleading information and subsequent changes in response bias at the recognition stage. These results are consistent with the prior analyses, and confirm that looking at recognition performance as a whole, positive or negative mood while receiving misleading information did have a significant influence on participants' ability to discriminate between correct and incorrect details they had seen, with negative mood improving, and positive mood impairing memory performance.

These findings support our main hypothesis that positive moods promote, and negative moods inhibit the kind of constructive, assimilative information processing style that facilitates the incorporation of misleading details into eyewitness accounts (Fiedler et al., 1991). Because one of the greatest threats to the accuracy of eyewitness memories is precisely the inadvertent, constructive incorporation of 'foreign' details (Schooler & Loftus, 1993), the empirical demonstration that this tendency is facilitated by positive mood has a variety of important theoretical and practical implications. Before discussing these issues, however, it is important to replicate and extend these findings in further experiments; this was the objective of the next study.

Experiment 2

The second experiment was designed as a further demonstration that transient moods can indeed have a significant impact on the accuracy of eyewitness reports. In contrast with Experiment 1, a realistic and more complex real-life incident rather than photos was used as the target event to be remembered. We also used a different mood induction technique (audio–visual mood induction), to establish the generality and robustness of these effects. As most mood induction techniques also produce additional, cognitive and motivational effects that might confound the results, it is important to use a number of different affect-induction strategies in a related series of investigations to establish the convergent validity of the mood effects. It is only by 'triangulating' mood effects across a number of induction methods that we can be confident that observed effects are indeed due to affective differences (Forgas, 2002).

To gain some insight into the degree of meta-cognitive awareness people possess about the accuracy of their eyewitness memories, participants in this experiment were also asked to indicate their confidence in their recollections. Based on most affect/cognition theories that assume that affective influences on thinking are subconscious (e.g., Fiedler, 2001; Forgas, 2002), and studies showing that people have little direct access to their mental processes (Nisbett & Wilson, 1977), we expected little conscious awareness of the misinformation effect and therefore no relationship between confidence judgments and accuracy. However, some theories such as Schwarz and Bless (1991) cognitive tuning model, and Martin, Ward, Achee, and Wyer (1993) 'mood as input' theory imply that processing decisions may often be based on high-level inferences informed by mood. If so, people may well become aware of their processing strategies, and may subsequently report less confidence when in a positive mood. Confidence ratings may thus indicate respondents' level of awareness of the processing consequences of moods, and also shed some light on the processing mechanisms that mediate mood effects on the misinformation effect.

Method

Overview, design, and participants

Students in a lecture theatre witnessed what they believed was an unexpected 5-min aggressive encounter between a lecturer, and a female intruder. One week later eyewitnesses to this episode received a mood induction (viewed short 10-min video-films), and then responded to a brief questionnaire about the episode they had witnessed that either did, or did not contain misleading information about the event. After a further 45-min interval, the accuracy of their eyewitness memory for the event was tested. The experiment is based on a 3×2 design, with mood (happy, control, and sad), and the provision of misleading information (present/absent) as the independent variables. Participants were 144 students (83 female, 61 male) with a median age of 19 who completed the experiment as part of their course requirements.

Mood induction

Videotapes were used to induce happy, neutral or sad moods in subjects, in what was described as a separate study to validate films for use in a later study. The use of video films to manipulate mood has been extensively tried and tested both in laboratory and field research, and has been found to produce salient and enduring moods (Forgas, 2002; Forgas & Moylan, 1987). The 10-min films used included scenes from: (a) a popular British comedy series (positive mood); (b) a program on architecture (control); and (c) a film dealing with death from cancer (negative mood). After the conclusion of the films, a short 'film assessment questionnaire' was administered, asking subjects among other things to rate their current mood on seven-point happy–sad and good–bad scales embedded among several other distracter questions (the *mood validation*).

The delivery of misleading information

Following the mood induction, participants were asked to answer four questions about the lecture room incident. Each question was prepared in two versions: a direct version containing no misleading information

(e.g., 'Did you see the lecturer removing his microphone as the woman approached?' 'Can you remember the young woman fiddling with her scarf as the lecturer spoke to her?'), and a parallel form containing planted, misleading information (set in *italics* here: 'Did you see the lecturer removing his microphone, as the woman *wearing a light jacket* moved towards him?' 'Can you remember the young woman fiddling with her scarf as the lecturer *gave her something from his wallet*?'). Half of the participants received the direct form, and half received the misleading form.

Measure of eyewitness accuracy

Next participants engaged in a variety of unrelated distracter tasks for about 45 min, involving the completion of several questionnaires and listening to a mini-lecture, and performing some calculations. They then completed the eyewitness accuracy questionnaire containing 12 true/false questions about the classroom incident. Four questions tested the recollection of actual, *correct details* of the episode (e.g., 'The lecturer removed his microphone as the woman approached'). Four questions tested memory for false, *misleading details* that were planted as part of the earlier manipulation (e.g., 'The woman was wearing a light jacket.'). Four question tested for *incorrect details* that were not part of the original episode (e.g., 'The lecturer wore a brown striped shirt'). Participants were also asked to rate their confidence in each of their responses. Based on this information, three sets of measures were calculated for each participant: number of *correct* details recognised, number of *misleading* details recognised, and number of *incorrect* details recognised, and the confidence judgments associated with each class of judgments.

Debriefing

The procedure was concluded by a careful debriefing. Questioning revealed no evidence of any awareness of the manipulations or suspiciousness about the tasks. We were careful to ensure that any residual mood after-effects were removed.

Results

Mood validation

As mood ratings on the happy–sad and good–bad scales were highly correlated, the two scales were again combined to create a single measure of mood quality (Cronbach's $\alpha = .80$). A univariate ANOVA of mood ratings found a highly significant mood effect $F(2,141) = 5.16$; $p < .01$. Those in the positive condition rated their mood as significantly better than did those who saw a negative film, $t(94) = 4.85$; $p < .01$, and both experimental groups were significantly different from controls, $t(94) = 3.24$; $p < .01$, $t(94) = 2.31$; $p < .01$ ($M = 6.20$, 4.65, 3.32). These results confirm that the mood induction was highly effective in generating reliably different mood states, as also found in previous experiments using this method (Forgas, 1995).

Eyewitness accuracy

Recognition scores on the three dependent measures (recollection of *correct*, *misleading*, and *incorrect* details) were subjected to a 3×2 MANOVA using the Wilks lambda criterion, with mood (happy, neutral, and sad) and the absence or presence of misleading information as the two independent variables. Once again, exposure to misleading information had a significant main effect, $F(2,138) = 3.15$; $p < .05$, and a significant interaction between mood and exposure to misleading information was also found, $F(2,138) = 3.67$; $p < .05$. To explore these effects, further univariate analyses of variance were carried out on recollections of correct, misleading and incorrect details separately. Recognition of correct and incorrect details was not influenced by either mood, or misleading information. As the manipulations were not designed to influence correct and incorrect recognition, these null effects are not unexpected.

It is memory for *misleading* details that was of greatest interest here. We found a significant main effect on false alarms due to the presence or absence of misleading information, $F(2,138) = 4.81$; $p < 01$, a significant mood main effect, $F(2,138) = 3.62$; $p < .05$, and also a significant interaction between the presence of misleading information and mood, $F(2,138) = 5.33$; $p < .01$, on this measure. The nature of these effects is clearly illustrated in Fig. 2.

As Fig. 2 shows, participants who were previously exposed to misleading information were significantly more likely to report 'false alarms', in other words, to report eyewitness memories for details they have not in fact seen. Mood also had a main effect on false alarms, with those in a negative mood showing overall fewer false alarms than did those experiencing positive mood. What is most interesting is the interaction between exposure to misleading information, and mood state found

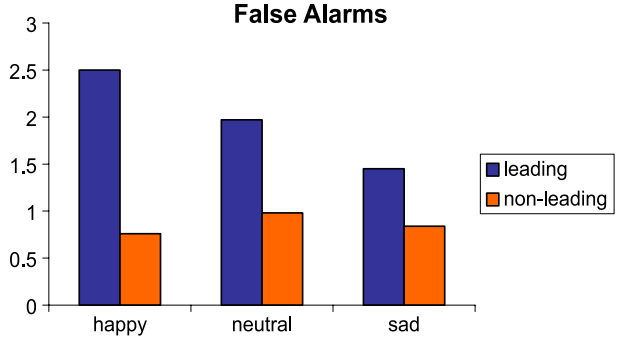

Fig. 2. The interaction between mood and the presence or absence of misleading information on recognition (Experiment 2): positive mood increased, and negative mood decreased the influence of misleading information on subsequent eye-witness reports (false alarms).

here. Persons experiencing a positive mood while receiving the misleading information were more likely subsequently to report it as true than did those not exposed to misleading details, $t(46) = 4.69$; $p < .01$. In contrast, negative affect seems to have all but eliminated this source of error in eyewitness recollections: exposure to misleading information did not result in higher false alarm rates in the sad mood condition, $t(46) = 1.12$; *NS*. Participants in the neutral mood group reported more false alarms after exposure to misleading information, but this effect was not as strong as in the happy group, $t(46) = 2.31$; $p < .05$.

Signal detection analysis

As in Experiment 1, an integrated signal detection analysis of the entire recognition performance was also performed. Hit and false alarm rates were calculated for each participant and a standard correction was applied when these rates were 0 or 1 (Snodgrass & Corwin, 1988). Using a log transformation method to approximate a normal distribution (Brophy, 1986), measures of discrimination (d′) and bias (C) were calculated. We found that discrimination (d′) was again significantly influenced by mood, $F(2,138) = 4.20$; $p < .05$. Negative affect when receiving misleading information resulted in better discrimination between correct and incorrect details compared to the control and the positive mood groups, respectively, $t(94) = 2.73$, $p < .01$; $t(94) = 1.94$, $p < .05$; ($M = .59, .38, .35$). There was no difference in d′ between the control and positive groups. As predicted, exposure to misleading information also impaired participants' discrimination ability, $F(1,142) = 4.68$; $p < .05$; ($M = .56, .32$). As in Experiment 1, response bias (C) was not influenced either by mood, nor by exposure to misleading information, $F(2,138) = .88$, *NS*; $F(1,142) = 1.13$, *NS*. The signal detection analysis is consistent with predictions, and shows that overall memory performance was significantly influenced by mood while receiving misleading information. Once again, negative mood states produced an improved ability to discriminate between false and correct information.

Analysis of confidence ratings

Confidence ratings for the recognition judgments were first subjected to a principal components analysis, that revealed that all confidence judgments were highly correlated, and loaded on a single factor, accounting for 61.5% of the variance. The four confidence judgments for each participant were thus combined into a single measure (Cronbach's $\alpha = .77$), and subjected to a 3×2 analysis of variance, evaluating the effects of mood, and the presence or absence of misleading information.

Results showed only a mood main effect, $F(2,138) = 3.87$, $p < .05$, indicating that those in a happy mood were significantly more confident in their recognition accuracy than were people in the neutral, $t(94) = 1.74$; $p < .05$ or in the negative mood conditions, $t(94) = 2.81$; $p < .01$, with no difference between the neutral and the negative mood groups ($M = 5.83, 5.01, 4.42$). This is an interesting and somewhat counterintuitive finding, suggesting that the positive mood group who were in fact least accurate and most influenced by misleading information were paradoxically also most confident that their memory was correct (Penrod & Cutler, 1996). This pattern seems consistent with a general mood-congruent effect on judgments, suggesting that the selective priming and greater availability of positive information in a good mood may have produced more optimistic—but also incorrect—confidence judgments.

The relationship between confidence ratings and accuracy was further assessed by calculating an overall correlation between individual confidence judgments and associated accuracy scores. Results showed a non-significant correlation, $r = -.078$, confirming that confidence judgments were not related to actual eyewitness accuracy. These results suggest that mood effects on eyewitness accuracy appear to operate at a subconscious level that is not open to meta-cognitive inspection. The lack of any relationship between confidence judgments and eyewitness accuracy indicates that participants had no real, direct insight into their own mental processes (Nisbett & Wilson, 1977) and presumably relied on affectively primed information when computing their confidence judgments.

Overall, these results support our main prediction, that positive mood states promote a constructive information processing style that promotes the incorporation of misleading details into eyewitness accounts (Fiedler, 2001; Fiedler et al., 1991). Can conscious efforts to suppress affect mitigate these effects? And what role do individual difference variables play in the misinformation effect? The next experiment was designed to investigate some of these questions.

Experiment 3

Experiment 3 sought to replicate the mood effects on eyewitness memory found previously, and also explored whether participants would be able to *actively suppress* the impact of their moods when instructed to do so. This issue is of some interest, because warning and instructing witnesses is still a fairly common strategy for limiting undesirable influences within judicial and forensic settings. In addition, the role of individual difference variables (such as self-monitoring and social desirability) in facilitating affect suppression, and mood effects on eye-witness accuracy were also investigated, based on previous evidence suggesting that such individual characteristics may play an important role in affective influences on cognition, and in eyewitness memory (Hosch, 1994; Rusting, 2001; Schooler & Loftus, 1993).

Affect suppression instructions

Previous studies suggest that increased self-awareness can often limit or even reverse mood effects on judgments and cognition (Berkowitz et al., 2000). In contrast, verbal instructions are often ineffectual, or even counterproductive when it comes to the control of cognitive and attentional processes (Wegner & Bargh, 1998). As verbal instructions are still used in some forensic and judicial settings, their efficacy in controlling affective influences on eyewitness accuracy were also explored here.

Individual differences

We also expected that individual difference variables could play an important role in affective influences on eyewitness reports, and on people's ability to control their affective states when instructed to do so (Hosch, 1994; Schooler & Loftus, 1993; Tomes & Katz, 1997). Prior studies suggest that people scoring high on traits such as self-monitoring and social desirability tend to engage in more motivated processing, and their judgments and behaviors are less open to incidental affective influences as a result (Forgas, 2002; Rusting, 2001). For example, high self-monitors might be particularly good at monitoring their moods and may thus be less open to misinformation effects when forewarned than are low self-monitors. Similarly, high concern with social desirability may increase the motivation to follow instructions to control mood. One objective of Experiment 3 was to explore the influence of such individual difference variables on affect control and on eyewitness memory.

Method

Overview, design, and participants

Students were shown two 5-min videotapes showing (a) a robbery in a convenience store, and (b) a wedding scene (the target episodes). They were instructed to "watch these events as if they were unexpected incidents they observed while walking on a street." After an interval of some 45 min filled with various distracter tasks, they were shown short 10-min video-films (in fact, the mood induction), and then received a short questionnaire about the episodes they witnessed that either did, or did not contain misleading information about the event, and that either instructed, or did not instruct participants to 'disregard and control their affective states' (the affect control manipulation). After a further 45-min interval filled with unrelated distracter tasks, the accuracy of their eyewitness memory for the two events was tested. The experiment is based on a $2 \times 2 \times 2$ design, with mood (happy, sad), the provision of misleading information (present/absent) and the affect control instruction (present/absent) as the independent variables. Participants were 80 students (49 female, 31 male) with a median age of 20 who completed the experiment as part of their course requirements. All participants also completed the Snyder self-monitoring scale, and the Crowne-Marlowe social desirability scale during a separate testing session at the beginning of the semester.

Mood induction, misleading information, and affect suppression manipulations

The same mood induction and mood validation procedure was used as in Experiment 2. However, only positive and negative mood induction tapes were shown. Following the mood induction, participants were asked to complete a brief questionnaire asking four questions about each of the three episodes they witnessed. In the affect suppression condition only, the following instructions were printed at the top of the questionnaire: "While doing this task, please make an effort to actively suppress how you might be feeling. This usually requires a determined effort to keep your affective state under constant control, making sure that you do not give expression to your feelings." Orthogonal to this manipulation, half of the participants received misleading questions, and half did not. There were four questions about each episode, each prepared in two versions: a direct version containing no misleading information (e.g., 'Do you remember the robbers putting handcuffs on the shopkeeper?'), and a parallel form containing planted, misleading information (set in *italics* here: 'Do you remember the robbers put handcuffs on the shopkeeper *before they gagged him*?). Half of the participants received the direct form, and half received the form containing misleading information. A post-experimental questionnaire was also administered at this time, asking participants to rate their mood on happy–sad and good–bad scales embedded among a number of distracter items (the *mood validation*).

Measure of eyewitness accuracy

After a 45-min distraction period filled with unrelated activities, participants completed the eyewitness accuracy questionnaire, containing 12 true/false questions about each of the witnessed episodes. Again, four questions each tested the recollection of actual, *correct details*, *misleading details* planted as part of the earlier manipulation, and *incorrect details* that were neither seen nor suggested. Participants also rated their confidence in each of their responses. Dependent measures thus included the number of *correct*, *misleading* and *incorrect details* remembered. A careful debriefing concluded the procedure, revealing no awareness of the manipulations.

Results

Mood validation

The happy–sad and good–bad mood validation scales were again highly correlated, and were combined to

construct a single measure of mood valence (Cronbach's $\alpha = .80$). A t test confirmed that participants in the positive condition rated their mood as significantly better than did those receiving negative feedback, $t(78) = 4.46$; $p < .01$ ($M = 2.55, 5.89$), confirming that the mood induction was again highly effective in producing different affective states.

Eyewitness accuracy

Recognition scores on the three dependent measures (correct, misleading, and incorrect details across the two witnessed episodes) were first subjected to an overall $2 \times 2 \times 2$ multivariate analysis of variance, with mood (happy, sad), misleading information (present/absent) and suppression instructions (present/absent) as the independent variables. Exposure to misleading information had a significant influence using the Wilks lambda criterion, $F(1,72) = 4.27$; $p < .05$, and there was also a significant interaction effect between mood and exposure to information, $F(1,72) = 3.51$; $p < .05$. Follow-up univariate analyses of variance were also performed on recognition for correct, incorrect and misleading details separately. Results showed no significant effects for *correct* and *incorrect* details, as expected. As predicted, the false alarm scores for *misleading details* were significantly influenced by exposure to misleading questions, $F(1,73) = 13.27$, $p < .01$, and we also found a as significant mood by misleading questions interaction effect, $F(1,73) = 4.19$, $p < .05$ (Fig. 3). No other main effects or interactions were significant. Thus, it appears that the mood suppression instructions had no detectable overall effect on eyewitness memory.

As Fig. 3 illustrates, exposure to misleading information significantly increased false alarms, and so reduced eyewitness accuracy, and did so most when people were in a happy rather than a sad mood. For those in a happy mood, exposure to misleading information produced significantly more false alarms, $t(38) = 3.61$; $p < .01$, while those in a negative mood showed a much smaller effect, $t(38) = 2.23$; $p < .05$. Overall, false alarm rates were significantly higher for those exposed to misleading information in the positive than in the negative mood condition, $t(78) = 3.44$; $p < .01$.

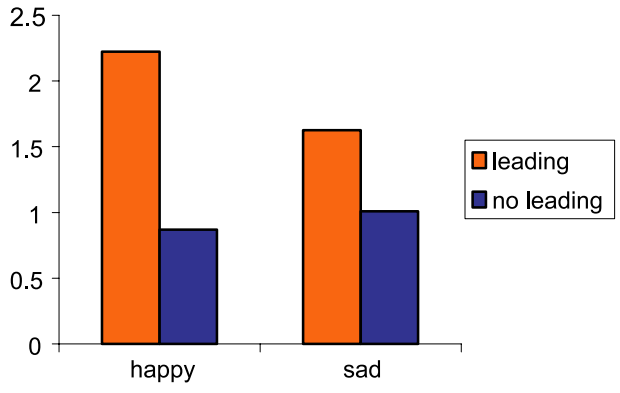

Fig. 3. The effects of induced mood and the presence or absence of misleading information on recognition (Experiment 3): positive mood increased, and negative mood decreased witnesses' susceptibility to misleading information provided after the event, as reflected in false alarm rates.

Signal detection analysis

An overall signal detection analysis of recognition performance was also carried out, as described in Experiments 1 and 2, based on the corrected hit and false alarm rates (Snodgrass & Corwin, 1988). Two signal detection indices, discrimination (d′) and bias (C) were calculated (Brophy, 1986), measuring ability to discriminate between correct and false details, and conservative vs. liberal bias in rejecting or accepting doubtful information, respectively. Affect significantly influenced discrimination (d′), $F(1,72) = 4.85$, $p < .05$, with markedly better discrimination performance in negative rather than positive mood ($M = .51, .27$). Neither exposure to false information, nor the affect control instructions had any influence on discrimination measure. The second, bias measure was not influenced either by mood, nor information exposure. However, we found that instructions to control affect had an unexpected effect, increasing a conservative bias, $F(1,72) = 3.97$, $p < .05$, ($M = .13, -.05$). The results of the signal detection analysis again confirm the beneficial effects of negative affect for subsequent recognition memory performance. It is interesting that instructions to control affect did not actually eliminate the mood effect, but rather, produced a more conservative response bias leading forewarned participants to reject doubtful information. This pattern confirms that instructions to control affect were not effective in achieving their purpose.

These results are clearly consistent with our primary hypothesis, that positive mood states promote a constructive information processing style that increases the likelihood that incorrect information will be incorporated into eyewitness accounts. Negative affect in turn appears to reduce susceptibility to misinformation. Because one of the greatest threats to the accuracy of eyewitness memories is precisely the inadvertent, constructive incorporation of 'foreign' details (Loftus, 1979; Wells & Loftus, 2003), the empirical demonstration that this tendency is facilitated by positive mood, and inhibited by negative mood may have a variety of important theoretical and practical implications.

Confidence judgments

Confidence ratings associated with the four recognition judgments for each of the two episodes were again highly correlated, and loaded on a single factor ($VAF = 59.2\%$). All confidence judgments were thus combined into a single measure (Cronbach's $\alpha = .78$), and subjected to a $2 \times 2 \times 2$ analysis of variance, evaluating the effects of mood, and the presence or absence of

misleading information, and mood suppression instructions on confidence judgments. We found a significant mood main effect, $F(1,72) = 4.48$, $p < .05$, indicating that those in a happy mood were significantly more confident in their recognition accuracy than were people in the negative mood condition ($M = 5.34$, vs. 4.02).

As also found in the previous experiment, a correlational analysis revealed no relationship between self-rated confidence and eyewitness accuracy, $r = .046$, confirming that participants had little apparent insight into their real level of eyewitness accuracy (Nisbett & Wilson, 1977; Penrod & Cutler, 1996). Rather, positive mood simply increased overall confidence, consistent with a general mood-congruent effect on judgments (Bower & Forgas, 2001; Schwarz & Bless, 1991). What role do individual differences play in these effects? We shall turn to this question next.

Self-monitoring

First, high and low self-monitors were identified on the basis of a median split ($M = 12.5$). We then included self-monitoring as an additional independent variable in the ANOVA; results showed a significant three-way interaction between self-monitoring, mood, and the affect suppression instructions, $F(1,72) = 4.25$, $p < .05$ (see Fig. 4). Among low self-monitors, mood, and the suppression instructions had no consistent effect on the number of false alarms reported. However, among high self-monitors there was a significant two-way interaction between mood and suppression instructions, $F(1,36) = 7.65$, $p < .01$. Suppression instructions reduced the number of false alarms in the positive affect groups, $F(1,39) = 4.14$, $p < .05$, and marginally increased the number of false alarms in the negative affect condition, $F(1,39) = 3.95$, $p < .06$ (Fig. 4). It seems that for high self-monitors only, instructions to suppress mood did have an influence on eyewitness accuracy, generally reducing the overall mood effects demonstrated earlier. This pattern indicates that affect-suppression instructions were only effective among high self-monitors, and led to happy participants becoming more, and sad participants becoming less accurate in an apparent reduction of the basic mood effects found here.

Social desirability

A dichotomous SD variable was created and included in the analysis by classifying participants as high and low on the basis of a median split on social desirability scores ($M = 14.5$). This analysis revealed a significant three-way interaction involving social desirability, mood and suppression, $F(1,68) = 4.32$, $p < .05$. For low SD participants, there were no interaction effects between mood and suppression instructions. However, there was a significant two-way interaction between mood and suppression instructions for high SD participants, $F(1,37) = 12.89$, $p < .01$. Among happy, high SD participants, suppression instructions reduced the number of false alarms reported, $F(1,38) = 13.75$, $p < .01$; but among sad, high SD participants, the effects of the suppression instructions were not significant, $F(1,38) = 2.69$, $p < .11$ (Fig. 5). Once again, we found that the effects of the mood suppression instructions were dependent on individual difference variables. When suppression instructions worked, their effect was to decrease false alarms (in happy mood), and increase false alarms (in sad mood), in essence ameliorating the information processing consequences of moods.

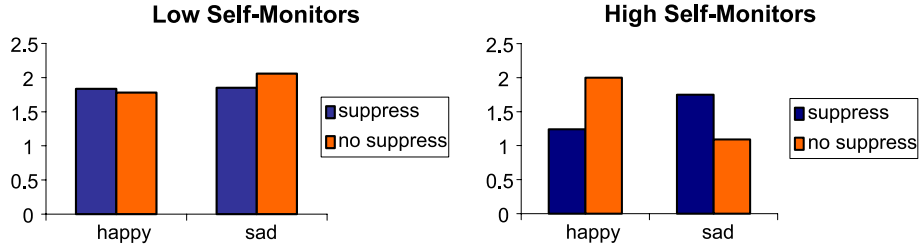

Fig. 4. The three-way interactive effects of mood, self-monitoring and affect suppression on eyewitness accuracy (false alarms for misleading details). For high self-monitors only, instructions to suppress positive affect reduced, and instructions to suppress negative affect increased recognition errors.

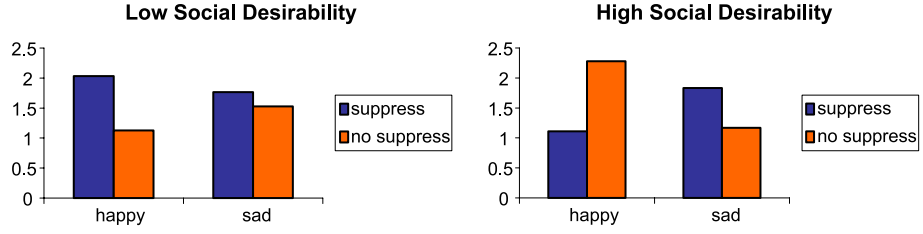

Fig. 5. The three-way interactive effects of mood, social desirability and affect suppression on eyewitness accuracy (false alarms for misleading details). For high social desirability participants, instructions to suppress positive affect reduced, and instructions to suppress negative affect increased recognition errors.

General discussion and conclusions

Remembering the details of observed events containing complex and often confusing information is one of the more demanding cognitive tasks people face in everyday life. Despite extensive interest in affective influences on cognition in recent years (Bless, 2000; Bower & Forgas, 2001; Eich & Macauley, 2000; Fiedler & Bless, 2001; Forgas, 2002), the influence of affective states on eyewitness accuracy has received less than adequate attention to date. These three experiments offer convergent evidence that transient moods do have a marked influence on people's susceptibility to misleading information when remembering witnessed events.

All three experiments showed that positive mood increased, and negative mood decreased the tendency to incorporate misleading details into eyewitness accounts. We also found that congruence between current mood and the affective valence of the target event provided no defence against misleading information (Experiment 1). Memories for real-life events (Experiment 2) were just as susceptible to affective influences as were memories for videotaped, or photographed scenes, and subjective confidence was unrelated to eyewitness accuracy (Penrod & Cutler, 1996). Paradoxically, happy mood reduced accuracy yet increased confidence, suggesting that people had little meta-cognitive awareness of their cognitive processes (Nisbett & Wilson, 1977), and were unaware of the consequences of their mood states for their thinking and memory (Berkowitz et al., 2000). Instructions to suppress affect had no overall effect, but were selectively effective for participants who scored high on self-monitoring, and social desirability. These experiments have several important theoretical, as well as some practical implications for our understanding of mood effects on social cognition and eyewitness recollections in particular.

Theoretical implications

Although considerable research now supports the prediction of mood-congruence, and mood-state-dependence in memory (Bower & Forgas, 2001; Eich & Macauley, 2000), less is known about the processing consequences of moods, and how they may impact on constructive memory processes. Our results are broadly consistent with recent affect-cognition theories that predict that good and bad moods should have an asymmetric effect on processing strategies and outcomes (Bless, 2000; Clore et al., 2001; Fiedler & Bless, 2001; Forgas, 1995, 2002; Schwarz, 1990).

Specifically, recent experiments suggest that negative moods often promote a more accommodating, externally oriented and piecemeal information processing style that often results in more accurate and less distorted judgments and inferences (Fiedler & Bless, 2001; Fiedler et al., 1991). For example, Forgas (1998a) found that happy moods increased and negative moods decreased the incidence of judgmental distortions such as the fundamental attribution error, while negative moods reduced these effects. Fiedler et al. (1991) also showed that positive affect promotes a more constructive processing style, increasing the likelihood that impression formation judgments will be influenced by previously primed information. The present experiments extend this literature by demonstrating a direct link between mood, and the tendency to incorporate misleading information into eyewitness memories.

It is particularly interesting that participants had little awareness of the effects of their mood on the accuracy of their memory. Indeed, their confidence was greatest precisely when they were most mistaken. The lack of any introspective awareness of affective influences on eyewitness accuracy may help to explain why instructions to suppress mood effects were also ineffective (Experiment 3). However, individual differences do seem to play some role in these effects. As also suggested in prior experiments, people who score high on traits such as self-monitoring and social desirability are also more likely to adopt a motivated, directed information processing style in social situations (Forgas, 1998b). Such individuals may be better able to act on affect-suppression instructions, leading to a reduction of both positive and negative mood effects on memory.

What can these results tell us about the cognitive mechanisms responsible for the misinformation effect in eyewitness memories (Schooler & Loftus, 1993; Wells & Loftus, 2003)? It is most likely that positive affect and the constructive, assimilative processing style it promoted simply increased people's tendency to receive subsequent misinformation in an uncritical, accepting manner (Bless, 2000; Fiedler & Bless, 2001). Once encoded, misleading details do not necessarily eliminate the original memory trace (Loftus, 1979), but simply become more accessible and so may interfere with the retrieval of correct details (Bekerian & Bowers, 1983). It may well be that these effects also depend on the strength of the memory trace, such that strong traces may be more likely to be resistant to incidental mood effects (Pezdek & Roe, 1995; Reyna & Lloyd, 1997), an issue that deserves further investigation.

Several theories specifically predict mood-induced processing differences consistent with the findings reported here. For example, Schwarz and Bless's (1991) cognitive tuning model as well as Martin et al.'s (1993) affect as input model both suggest that positive moods can inform people of the need to engage in less extensive, vigilant processing. Alternative models emphasize the role of good or bad moods in recruiting more or less systematic processing (Bodenhausen, 1993; Clore et al., 2001; Schwarz, 1990; Stroessner & Mackie, 1992). Our findings are not simply due to mood-induced differences

in processing effort and vigilance (Bless, 2000). Rather, affective states seem to recruit qualitatively different processing strategies, suggesting a dichotomy between externally oriented, accommodative (in negative mood) vs. constructive, assimilative (in positive mood) processing styles (Bless, 2000; Fiedler, 2001) that can account for just the kind of differences in eyewitness memories we found here. Our results also support Fiedler et al.'s (1991) dual-force model that suggests that positive affect promotes more constructive processing, for example, in impression formation judgments. Indeed, based on their model, Fiedler et al. (1991) specifically anticipated that "good mood can be predicted to produce more false alarms in eyewitness reports" (p. 376), exactly what was found here.

Practical implications

The ability to correctly remember the events we witness also plays an important role in many spheres of everyday life. Eyewitness recollections are especially important in judicial decisions and in forensic practice. Despite accumulating evidence for the role of affect in memory and many other social cognitive tasks (Clore et al., 2001; Forgas, 1995, 2002; Fiedler & Bless, 2001; Mayer & Hanson, 1995; Sedikides, 1995), not much attention has been paid to the role of moods, as distinct from more intense emotions in eyewitness memories. Forensic research has mainly looked at the effects of more intense arousal states and specific emotions, as well as context effects on eyewitness accuracy (Davies & Milne, 2003; Malpass, 1996); relatively little work has been done on the effects of mild, everyday mood states. The finding that positive affect can magnify, and negative affect can reduce the misinformation effect suggests that even mild affective states may be of interest in forensic practice. Warnings and instructions, sometimes used to safeguard against distortions in judicial practice, are unlikely to be universally effective in controlling such affective influences. Affect-control instructions may only be effective for individuals who are more able (high on self-monitoring) and willing (high on social desirability) to follow such instructions.

Limitations and future prospects

There are also some limitations to these results. Past evidence suggests that mood effects on cognition are quite subtle, and often depend on the kind of processing strategy adopted by people (Forgas, 1995, 2002). It may well be that in circumstances that call for more motivated processing (for example, due to the increased personal relevance of the task; Forgas, 1995, 1998b) the effects of mood on eyewitness memory may be reduced. These effects also may well be highly sensitive to pragmatic and situational variables such as the identity, status and influence of the person planting the misleading information, the nature of the event to be remembered, and the nature of the memory task. There is considerable scope in future studies to explore the role of various pragmatic variables in recruiting different processing strategies, and thus mediating the ensuing mood effects on eyewitness memory.

Future experiments may also directly explore the processing mechanisms responsible for these effects, for example by recording the processing latencies involved while happy and sad individuals respond to misleading questions. This approach has been successfully used in past work assessing mood effects on memory and judgments. Results did show that processing latency is often an important mediator of mood effects (Bower & Forgas, 2001; Forgas, 1995; Sedikides, 1995). Further, as noted before, moods may influence memory at each of the three stages of the eyewitness process: encoding (when first witnessing an event), subsequent re-processing (the post-event misinformation stage), and final retrieval and judgments. These experiments focused on stage two only; future experiments may explore mood effects on the encoding and retrieval stages as well.

We should also note that eyewitness researchers frequently use procedures other than true/false recognition tests to assess eyewitness accuracy, such as free recall and open-ended responses as suggested by the cognitive interview technique (Davies, 1993; Malpass, 1996; Wells & Olsen, 2003). Thus, replicating our results with different response paradigms would be desirable. Another issue concerns the external validity of our results, a question of particular importance in studies of eyewitness memory. Given the consistency of the results across three experiments, different target events and different mood inductions we can be reasonably confident of the reliability of these effects; nevertheless, it would be important to demonstrate corresponding mood effects on eyewitness memory in naturalistic situations and using a variety of paradigms (cf. Mayer & Hanson, 1995).

Remembering personally witnessed events can be a complex cognitive task that requires constructive processing that is open to a variety of distortions (Davies, 1993; Loftus, 1979; Malpass, 1966). Our results suggest that positive mood increases, and negative mood decreases the likelihood that false information will later be remembered as true. Much has been discovered about the processes that govern constructive memory processes in recent years, yet not enough is known about how feelings impact on the accuracy of eyewitness memories. Based on recent research on affect and social cognition (Clore et al., 2001; Fiedler, 2001; Forgas, 1995, 2002; Mayer & Hanson, 1995; Salovey & Birnbaum, 1989), our results suggest that both good and bad mood can have a significant impact on eyewitness memories, due to the kind of information

processing strategies they generate. Recent affect-cognition theories (Bless, 2000; Fiedler, 2001; Forgas, 1995, 2002; Schwarz, 1990) appear particularly relevant to understanding these subtle and process-contingent effects. Further research on affect and eyewitness memory should be of considerable theoretical, as well as applied interest.

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